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Production of field peas in Canada

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Production of field peas in Canada

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Recommendations for pesticide use in this publication are intended as guidelines only. Any application of a pesticide must be in accordance with directions printed on the product label of that pesticide as prescribed under the *Pest Control Products Act*. **Always read the label**. A pesticide should also be recommended by provincial authorities. Because recommendations for use may vary from province to province, your provincial agricultural representative should be consulted for specific advice.

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Preface

This publication provides information on growing and managing field peas in Canada. It can be used as a guide by farmers, extension workers, and others interested in the production of field peas. For the latest recommendations on the use of pesticides, consult provincial publications and schedules, which are updated annually.

Field peas are an important cash crop in western Canada and their role in the agricultural economy of Canada is increasing rapidly. Production of field peas has increased dramatically in Saskatchewan, and interest in this crop is increasing in Manitoba and Alberta as well as in eastern Canada.

The value of field peas as food is well established. The processing of pea soup is an important industry in Canada. Field peas are exported to many countries in the world, both as human food and animal feed. New products such as protein, starch, and fiber are being manufactured from peas for use in food and industrial products. It is predicted that the demand for field peas will continue to be strong.

The research station at Morden, Man., has the primary responsibility for research on field peas in Canada. Research is under way to develop high-yielding cultivars and to solve problems related to diseases and weed control, management practices, and cooking quality. In the past 15 years six high-yielding cultivars have been released to growers, and recommendations have been developed to control diseases and improve management practices. These achievements have contributed substantially to greater productivity and increased financial returns to growers and processors. Morden Research Station will continue to emphasize plant breeding and problem-solving research. We welcome enquiries from the public on any aspect of our research program.

Introduction

The production of field peas, or dry peas, *Pisum sativum* L., has increased dramatically in western Canada. In 1985 the area seeded to field peas was only 80 500 ha, whereas in 1987 a record 300 000 ha were seeded in Canada. All three Prairie Provinces recorded large increases, with Saskatchewan leading (155 000 ha), followed by Manitoba (74 000 ha) and Alberta (71 000 ha). The main reasons for these increases were low prices of cereal grains and increased world demand for dry peas, especially in feed markets.

Traditionally, Canadian farmers have grown yellow-seeded soup-type peas for both domestic and export markets. In 1987 and 1988, 8 000–12 000 ha of green-seeded peas were grown in Saskatchewan and Alberta. In addition, farmers are showing considerable interest in growing feed pea cultivars imported from Europe.

Over 80% of the Canadian field pea production is exported to about 20 countries in Europe, South America, and Asia. In Canada, dry peas are used for making soup and marketed as processed soup in cans. Peas are also marketed in whole or split form in packages. Recently, a processing plant in Manitoba has been producing various protein, starch, and fiber fractions from pea flour for food enrichment and industrial use. Pea fiber has been in great demand for use in high-fiber bread or pasta.

Because of recent improvements in production technology and the introduction of high-yielding cultivars, the yields of field peas have increased steadily. In favorable soil and weather conditions, yields of 2500 kg/ha are not uncommon in the major pea-growing areas of Manitoba and Saskatchewan.

There are many advantages to growing field peas. As a cash crop they provide farmers with ready cash when delivered to the elevators. Fertilizer expenses for peas are less than for other crops, as pea plants fix a portion of their nitrogen needs directly from the atmosphere with the help of *Rhizobium* bacteria, which are present in the root nodules.

Adaptation

Peas are well adapted to a cool climate and can be grown successfully in Canada. A large hectarage of field peas was initially located in eastern Canada, but because of severe disease problems such as root rot, ascochyta, bacterial blights, and powdery mildew, the production shifted to the Canadian prairies.

In Manitoba most peas are grown in the Red River Valley and the Pembina Triangle, including Morden, Winkler, Carman, Altona, St. Jean Baptiste, and Morris. A large area is also located around Portage la Prairie, Dauphin, and Arborg.

In Saskatchewan the major pea-growing area is located in the north, around Nipawin, Tisdale, and Melfort, but recently production has been expanding to North Battleford, Lloydminster, Humboldt, North Saskatoon, and Indian Head.

In Alberta most field peas are grown near Edmonton, Camrose, and Lacombe. Farmers in Alberta are showing considerable interest in producing dry peas for animal feed, which is extending field pea production into southern Alberta.

Selection of land and crop rotation

Well-drained clay loam soils are best suited for peas. Light, sandy soils with a low moisture-holding capacity tend to produce lower yields. Poorly drained, saline, and stony land should be avoided.

To reduce risk of disease, peas should not be grown again on the same land for at least 4 years. Other grain legumes such as lentils, field beans, and fababeans also should not be grown after peas, because they are susceptible to the same diseases. Other crops such as sunflower, canola, mustard, and safflower, which are susceptible to sclerotinia white mold, should also be avoided in rotation.

Fertilizers

The soil should be tested to determine its fertility. Pea plants can fix some of their nitrogen needs from the atmosphere with the help of nitrogen-fixing bacteria. The amount of nitrogen fixed by the plants varies according to soil and weather conditions, the inherent ability of cultivars to fix nitrogen, and the amount of *Rhizobium* bacteria present in the soil. Generally, pea plants can fix 30–50% of their nitrogen needs from the atmosphere. The rest of the nitrogen needs are met by the soil and fertilizer. Excess application of nitrogen increases vegetative growth and delays maturity. Peas respond well to phosphorus and potash fertilizers. Sandy and sandy loam soils usually contain low amounts of available potassium, and therefore a potassium fertilizer is often needed. For general fertilizer needs, the application of P_2O_5 and K_2O at a rate of 30–45 kg/ha and 37–70 kg/ha, respectively, are recommended. P_2O_5 at 20 kg/ha or less can be applied with the seed, but all additional fertilizer should be applied as a side-band application. On well-drained sandy soils and Grey wooded soils, sulfur applied at a rate of 20 kg/ha is recommended.

Seedbed preparation

Peas can be grown on either summerfallow or on cropped land. Crops other than grain legumes benefit more if grown on summerfallow, since grain legumes such as peas can fix some of their own nitrogen needs and may not benefit as much from nitrogen reserves in the soil.

In the moister regions of Canada, land with a large amount of residue from the previous crop can be disced in the fall to incorporate residues. Land can be cultivated in early spring to speed up drying and warming of the soil. This practice is not recommended in the drier areas of the prairies, where moisture conservation is a major concern. Cultivation should start a few days before seeding. Shallow cultivation is recommended to conserve soil moisture. Keep the seedbed firm to promote uniform germination. Preplant herbicides such as trifluralin can be applied at this stage and incorporated according to recommendations.

Peas can also be grown on zero or minimum-tilled land, but special equipment is needed for seeding. Initial results at the Indian Head Experimental Farm, Sask., have indicated no differences in yield of peas grown under conventional, minimum, or zero tillage.

Seed treatment

To improve germination and reduce diseases, treat the seed with a recommended fungicide. Just before seeding, inoculate the seed with recommended nodule-forming bacteria. Treatment with inoculum is especially needed on land where peas were not grown previously.

Pea inoculum and recommendations for its use are available from seed companies. An inoculum that is made specifically for peas must be used. Store inoculum in a dark and cool storage area, as light and warm temperatures reduce its effectiveness. Use a sticking agent when applying inoculum to the seed. Granular inoculum that can be drilled with the seed is now available.

Seeding

Use pedigreed seed of a recommended cultivar. Pedigreed seed is of high quality and has been checked for diseases, purity, and germination.

Early seeding is recommended. Experiments at the Morden Research Station have shown that seeding in early May produces the best results. Seeding rates depend on the type of cultivar and its seed size. For large-seeded cultivars like Century and Triumph a seeding

rate of 170–200 kg/ha is recommended. For small-seeded cultivars such as Trapper use 130 kg/ha. Cultivars with medium seed size such as Tipu or Tara require 150 kg/ha.

Sow the seed 5–8 cm deep in rows 15–18 cm apart. A regular grain drill or discer seeder can be used, but proper adjustments are necessary to avoid damage to seed, especially with large-seeded cultivars.

Weed control

Because peas do not compete well with weeds, a thorough weed control program is essential. Table 1 lists some herbicides that can be used on various weeds. For current recommendations consult your provincial guide to chemical weed control. Always follow the instructions on the label when you are using a herbicide.

Table 1 Herbicides for use on weeds

Weed	Recommended herbicide
	Preplant-incorporated treatment
wild oats, green foxtail, buckwheat, pigweed, lamb's-quarters	Treflan, Rival, Triflurex, Edge
wild oats	Avadex BW
	Postemergence treatment
wild oats, green and yellow foxtail, barnyard grass	Hoegrass, Poast
green foxtail	Basfapon, Dalapon, Dowpon, TCA, Bar-fox
stinkweed, pigweed, lamb's-quarters, Canada thistle, top growth of perennial sow-thistle	Tropotox Plus
stinkweed, wild mustard, lamb's-quarters, flixweed	MCPA sodium salt
smartweed, wild mustard, stinkweed, redroot pigweed	Basagran, Lexone, Sencor
wild oats, green foxtail, annual grasses, but not volunteer cereals	Excel

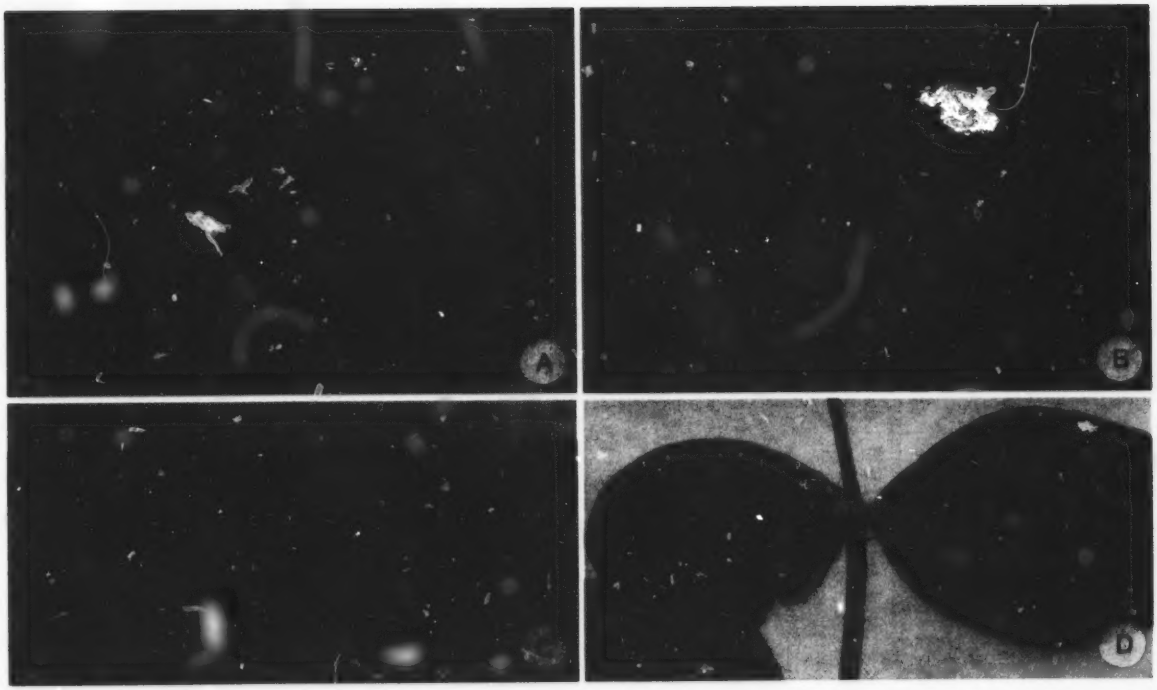

Plate I Diseases and insect damage

A, bacterial blight; B, powdery mildew; C, aphid damage; D, *Mycosphaerella pinodes*.

Diseases

Mycosphaerella blight

Mycosphaerella blight, caused by the fungus *Mycosphaerella pinodes* (conidial stage, *Ascochyta pinodes*), is the most important disease. In addition to mycosphaerella blight, peas are affected by two other *Ascochyta* diseases: leaf and pod spot caused by *Ascochyta pisi* and foot rot caused by *Phoma medicaginis* var. *pinodella* (=*Ascochyta pinodella*). Since the introduction of the field pea cultivar Century in 1961, leaf and pod spot has become unimportant. Lesions caused by *M. pinodes* and *P. medicaginis* var. *pinodella* cannot be distinguished readily without laboratory examination. If damage to leaves, stems, and pods is severe and widespread, one can assume that it is caused by *M. pinodes*; and if severe below-ground damage occurs, especially near the seed zone, *P. medicaginis* var. *pinodella* should be suspected. The severity of infection depends on the frequency of rain and heavy dew during the growing season. Moderate or severe infection with *M. pinodes*, the most damaging of the three pathogens, can reduce yield by 20–50%.

Initial symptoms of ascochyta blight on the leaves, stems, and pods are small dark purplish spots with irregular margins. These lesions may become enlarged under favorable weather conditions and may fuse to form irregular brownish purple blotches. A severe infection causes desiccation of leaves on all but the highest nodes, giving the field a dry, brownish appearance with a canopy of green on top. The pathogen also infects the seed through the pods. Infected seed may appear healthy or may show varying degrees of shrinkage and discoloration.

The pathogen can survive in the seed, in overwintered pea straw on the soil surface, or in the soil. Initial infection in the spring can originate in infected seed, in a windblown spore formed on exposed overwintered straw and stubble, or in a winter-resistant soil-borne spore. From initial seedling infection, the disease spreads at regular intervals up the plant and to neighboring plants under conditions of high moisture.

To control this disease, plant pedigreed seed, disc under crop refuse as soon as possible after harvest, control volunteer seedlings in the fall to prevent their infection, include peas in rotation not more than once every 5 years, and locate new plantings as far away as possible from the previous year's fields. Treat seed with a fungicide to reduce or eliminate infection from the seed.

Powdery mildew

Powdery mildew is a disease as widely distributed as the crop. It may become severe on field pea crops that mature in late summer. Late maturity can result from delayed seeding of cultivars that

mature early or in mid season, or from normal seeding of late-maturing cultivars.

The disease first appears as small diffuse white spots on the upper surface of older low leaves. These lesions may spread, giving the leaf a white powdery appearance. The tissue beneath severely infected areas may turn purplish brown. Studies in Manitoba indicate that the disease first appears around 17–21 July.

The potential for the development of powdery mildew on cultivars currently licensed in Canada varies. Tara is highly resistant; Century, Trapper, Titan, Lenca, Bellevue are intermediate in resistance; and Triumph, Victoria, Tipu, Express, and Fortune are susceptible. Express matures early and should therefore escape serious infection when seeding is not delayed. Use caution when growing this cultivar in short-season growing areas such as northern Saskatchewan, as this northern location could nullify the early maturity of the cultivar. Fortune is a late-maturing cultivar and should be sown early in southern regions of pea-growing areas.

Root rots, seed decay, seedling blight, and wilt

The root rot caused by *Fusarium solani* f. sp. *pisi* is probably the most apparent of the soil-borne diseases, especially in Manitoba. Infection usually starts on seedlings at the point where the seed is attached and may extend up the stem and down the root as a reddish brown discoloration. Symptoms vary from yellowing of a few leaves to pronounced yellowing and severe stunting of plants. The cultivars currently grown appear to have a measure of resistance because only a small percentage of plants become affected each year.

Other root diseases are caused by *Rhizoctonia solani* and *Pythium ultimum*. *R. solani* causes mainly a seedling disease that occurs early in the season when the soil temperature is cooler, 15–18°C. Symptoms on the hypocotyl and epicotyl of infected seedlings may appear as water-soaked lesions, followed by yellowish brown to brownish lesions. Affected plants may show wilting, stunting, leaf yellowing, root decay, and brownish root rot. If the growing point is infected, the seedling may die as it emerges. *Pythium* disease symptoms are characterized by a watery soft rot, subsequent decay, and browning of infected tissue. The disease is favored by wet soils in the temperature range of 18–20°C.

For the three root diseases mentioned, excessive soil moisture intensifies the symptoms. Fields with poor drainage should be avoided. The fields should be worked thoroughly before planting; soil compaction should be avoided, especially in the case of fusarium root rot. The *Rhizoctonia* and *Pythium* diseases are generally not a problem in Manitoba. Aphanomyces root rot, another root rot affecting peas, caused by *Aphanomyces euteiches* f. sp. *pisi*, is also not a problem on field peas in western Canada. It is found occasionally in eastern Canada on moist soils. Field peas should be included in the

rotation only once every 5 years; flax, sugar beets, and legumes should be avoided immediately before or after planting peas.

Treating seed with fungicides controls seed decay and damping-off, but not root rots. Captan, thiram, and fenaminosulf are licensed in Canada as seed treatments for seed decay and seedling blights. The viability of *Rhizobium* inoculum applied to seed may be reduced by seed treatment fungicides; current research indicates that captan may be more detrimental to *Rhizobium* viability than thiram.

Sclerotinia rot (white mold)

This fungal disease is sporadically severe in field pea crops after they have passed the full-bloom stage. Yield losses generally are minor except under conditions of heavy vine growth and prolonged wet weather. Black resting bodies (sclerotia) may develop on and inside pods and stems and contaminate harvested peas.

At later stages of growth, watery lesions develop on any plant structure not exposed to air circulation. Fluffy white mycelium develops next, followed by dense mycelial mats; affected areas become slimy. The plants may wilt or ripen prematurely, and if infected shoots are traced back into the crop canopy, bleached infected portions of the stem are found that break and shred readily. To control this disease, rotate to crops that are immune, such as cereals, corn, and grasses. These crops allow a reduction of viable sclerotia in the soil. A rotation should be followed in which susceptible crops are planted only once every 5 years. The following crops are susceptible to this pathogen: buckwheat, canola and rapeseed, fababeans, field beans, lentils, mustard, peas, safflower, soybeans, and sunflowers.

The use of semileafless peas should reduce the incidence and severity of the disease by improving aeration.

Bacterial blight

Bacterial blight is caused by the bacterium *Pseudomonas pisi*. The pathogen is usually seed-borne, but it may remain viable for 1 year in pea straw. Infection originates in the spring from infected seeds. It may be spread rapidly by splashing rains and injury to the plants such as that caused by hail.

Symptoms appear as water-soaked lesions on the leaves, stems, and pods. Later, these spots dry and turn light brown with an olive brown edge.

The disease can be controlled by following the same crop sanitation measures outlined for mycosphaerella blight. Consistent production of disease-free seed in Canada is not possible because of the climate. Seed has been found to be most satisfactorily produced in irrigated areas where rainfall is less than 120–130 mm during the growing season.

Wilt

This disease, which occurs in a few pea fields in western Canada, is more common in Ontario and eastern Canada and in the cultivars of processing peas. Early symptoms caused by the fungus *Fusarium oxysporum* f. *pisi* are yellowing of lower leaves, stunting, and slight downward curling of leaf edges.

Losses from this disease have been reduced through the development of resistant cultivars. The current field pea cultivars in commercial production appear to have some tolerance for the disease because wilt is not a problem.

Crop rotation is not an effective control measure against the pathogen, which can persist in the soil for long periods.

Other diseases

Diseases such as anthracnose, downy mildew, septoria blight, and those caused by several viruses are rarely severe enough to create a serious problem.

Insect control

The pea aphid is the most important insect of field peas. Pea plants can support small populations of aphids with little injury, but in hot dry weather aphids propagate quickly and can cause severe damage to the plants. Aphid populations are generally low throughout the month of June but at the beginning of July, numbers increase rapidly and the population peaks in late July or early August.

The damage to the pea plants is most severe at flowering or at the early pod stage. It is very important to choose the right stage for control in order to receive the maximum benefit from insecticide sprays. Start checking your fields at the flowering stage. Sample 20–25 plants in various areas of your field and count the number of aphids on plant tips. If you find more than 2–3 aphids per 20 cm of plant tip, spray the field with a recommended insecticide. Consult your provincial guide for the latest recommendations on insect control.

Harvesting

Harvest peas when they are fully mature and hard in the pods. Harvesting at a 16–18% seed moisture level is recommended. To maintain seed color of green-seeded cultivars, harvest them early, at

18–20% seed moisture, and dry the seed artificially to reduce the moisture to 16%. A desiccant can be used to kill the green growth of weeds or the secondary growth of pea plants. Make sure that you do not spray desiccant too early in the seed formation phase, as early spraying causes the seed coat to wrinkle. For the latest information on desiccation, consult your provincial agricultural representative. Do not delay harvesting after peas are mature, as weathering will cause shattering and reduce cooking quality, germination, and seed color.

Peas can be combined directly or after swathing. Direct combining reduces seed losses that occur during swathing, but swathing may be necessary if there are green weeds or secondary growth on the pea plants. If you choose to windrow your crop, do this on a calm day and run the combine close behind the swather. If windrows are to be left overnight, pack them with a light roller to prevent their being blown by the wind.

Proper adjustment of the combine is essential for successful harvesting. Study your guide on combine operation thoroughly and use the adjustments recommended for field peas.

Some attachments, such as pick-up fingers, pick-up reels, floating cutter bars, and automatic header height controls, increase the efficiency of combining peas. Since pea plants lie flat on the ground at the time of harvest, cutting attachments are needed to cut them efficiently at this level.

Adjustment of the cylinder speed is very important to avoid splitting the peas. It should be adjusted to 500–600 rpm. The condition of the crop and the moisture content of the peas will affect your choice of cylinder speed. A trial run with the combine should be made to make sure that all adjustments are correct.

If immature weed seeds or other damp materials are found in the threshed peas, clean the peas promptly to avoid heating in the bin.

Seed drying and storage

Generally, seed drying after harvest may not be necessary. Canadian seed grade standards require field peas to be below 16% moisture. Peas usually are not harvested until they reach this level. Drying of seed may be required only if early harvest is chosen to maintain the seed color of green-seeded cultivars.

Clean peas to remove immature, green weed seed and other high-moisture material. Many seed dryers that are satisfactory for drying peas are now available. If the peas are to be used for seeding in the following year, do not exceed an air temperature of 45°C for drying them; otherwise temperatures up to 71°C can be used. Peas can also be dried naturally in the air. This method costs less and requires less labor and attention. Refer to provincial bulletins on seed drying for the latest recommendations.

Store peas in a dry place or in a bin. To avoid heating in the bin, make sure that green seeds or other materials that contain high moisture are cleaned out. When using augers to load or unload peas, run them at a low speed to avoid excess seed splitting.

Marketing

Farmers who have contracts can deliver their peas to the contracting elevators. These elevators clean and grade the seed and either export it or sell it in the domestic market. Peas are also bought and sold at current prices in the open market.

Over 80% of the Canadian field pea production is exported to about 20 countries in the world. A small proportion of the peas are split and sold as split peas in Canada and abroad. In 1986 Canada traded almost $40 million worth of peas in world markets. A new market for peas as animal feed is emerging in Europe. It is expected that a large quantity of Canadian peas will be exported there in the future.

Processing of peas for the production of edible fiber, protein concentrate, and starch would increase domestic consumption by several thousand tonnes.

Cooking quality

The cooking quality of peas is very important, especially if they are to be used for making soup. Good-quality peas produce good yellow soup and cook within a prescribed time. Processors do not accept peas that take too long to cook or produce a soup that is gray. Many factors affect cooking quality: differences in cultivars, soil types, fertilizers, harvest dates, and weather conditions. However, peas grown under good management practices usually have been found to have good cooking quality.

The following points are important in the production of good-quality peas.

- Test the soil for nutrients, and fertilize according to recommendations.
- Phosphorus nutrition is important, as it helps to improve cooking quality.
- Do not add excess nitrogen fertilizer, because it reduces cooking quality.
- Plant good, preferably pedigreed, seed of a recommended cultivar.
- Control weeds and insects early to avoid serious damage to plants.
- Harvest the crop as soon as it is mature, because delayed harvest reduces cooking quality.

Cultivars

In Canada over 90% of field peas grown are yellow-seeded and the remainder are green-seeded. Century is a widely grown cultivar that occupies about 45% of the land planted to peas. The balance of the field pea area is planted to Trapper, Tipu, Victoria, and some unregistered cultivars.

A number of new cultivars have been registered recently that are under preliminary stages of seed increase. The following is a short description of cultivars registered in Canada (See Table 2 for performance data).

Century was developed by Agriculture Canada, Ottawa, Ont., in 1960. It is a yellow-seeded cultivar with medium to large seeds (235 g per 1000 seeds). Century is well adapted across Canada and is widely grown in western Canada. Breeder seed is distributed by Agriculture Canada, Experimental Farm, Indian Head, Sask.

Trapper was developed by Agriculture Canada, Morden, Man., in 1971. It is yellow-seeded and has small seeds (135 g per 1000 seeds). Trapper is high-yielding and contains a high protein content. The

Table 2 Characteristics of field pea cultivars

Cultivar	Yield		1000 seed weight (g)	Days to maturity	Vine length (cm)	Cooking quality*			Protein (%)
	kg/ha	bu/ac				color	granulation	viscosity	
Bellevue	2115	31.4	180	104	102	3.2	3.0	19.2	22.4
Century	1894	28.2	238	99	112	2.6	2.5	14.2	22.8
Express	2200	32.7	238	94	68	2.9	2.9	16.5	22.5
Fortune	2123	31.6	192	103	78	2.7	2.5	15.2	22.7
Lenca	2128	31.6	215	99	109	2.7	2.8	16.6	22.8
Tara	2183	32.5	211	100	107	2.8	2.5	16.9	22.1
Tipu	2042	30.4	230	98	112	2.7	2.6	16.0	21.1
Titan	2185	32.5	266	101	116	2.7	3.0	17.0	22.0
Trapper	1932	28.7	148	98	101	2.8	2.5	17.5	23.2
Triumph	2020	30.0	318	102	77	2.9	2.8	17.5	23.1
Victoria	2157	32.1	187	95	95	2.9	2.8	17.0	22.8

Data from 1984–1986 cooperative tests, 23 station-years.

* Color and granulation on a scale of 1–5, where 1 = very good and 5 = poor. A scale of 1–24 was used for viscosity, where 1 = high (good) and 24 = low (poor).

major hectarage of Trapper is located in Saskatchewan. Breeder seed is distributed by Agriculture Canada, Experimental Farm, Indian Head, Sask.

Triumph was developed by Agriculture Canada, Morden, Man., in 1973. It is a green-seeded cultivar with large seeds (275 g per 1000 seeds). Triumph is high-yielding, but matures later than Century or Trapper. Triumph seed is also susceptible to bleaching. It should therefore be harvested soon after maturity. The SeCan Association, Ottawa, Ont., has seed distribution rights.

Tara was developed by Agriculture Canada, Morden, Man., in 1978. It is yellow-seeded and has medium-size seed (215 g per 1000 seeds). Because a portion of Tara seed is irregular in shape, it is discounted. Tara is the only pea cultivar highly resistant to powdery mildew. Its yielding ability is high, and it is therefore a good choice for selling in the feed market. The SeCan Association, Ottawa, Ont., has seed distribution rights.

Lenca was developed by Agriculture Canada, Morden, Man., in 1979. It is yellow-seeded and has medium-size seed (200 g per 1000 seeds). It is well adapted to eastern Canada, where it yields higher than Century. It is recommended in Ontario, Quebec, and the Maritime Provinces. The SeCan Association, Ottawa, Ont., has seed distribution rights.

Finale was developed by Cebeco Handelsraand, the Netherlands, and was registered in Canada in 1981. It is a green-seeded cultivar with large seeds (280 g per 1000 seeds) and early maturity. It is well adapted to the Maritime Provinces where it is grown on a very small hectarage. The Minos Seed Cooperative has seed distribution rights.

Victoria was developed by A.B. Svalof, Sweden, and was registered in Canada in 1984. It is yellow-seeded and has medium-size seeds (185 g per 1000 seeds), early maturity, and high yields. It is suitable for growing in the northern areas of Saskatchewan and Manitoba. The following companies have seed distribution rights: Bonis and Company, Lindsay, Ont.; Manitoba Pool Elevators, Winnipeg, Man.; and Newfield Seeds, Nipawin, Sask.

Tipu was developed by Agriculture Canada, Morden, Man., in 1985. It is the first semileafless cultivar registered in Canada. It is yellow-seeded and has medium-size seeds (230 g per 1000 seeds). It is superior in standing ability and offers many other agronomic advantages. For example, it is easier to harvest than other cultivars, it has early and quick dry-down at harvest, and it is easier to spray

with herbicide or insecticide. The SeCan Association, Ottawa, Ont., has seed distribution rights.

Titan was developed by Agriculture Canada, Morden, Man., in 1985. It is yellow-seeded, has medium to large seeds (260 g per 1000 seeds), and is high yielding. The SeCan Association, Ottawa, Ont., has seed distribution rights.

Fortune was developed by A.B. Svalof, Sweden, and was registered in Canada in 1986. It is yellow-seeded and has medium-size seeds (195 g per 1000 seeds), high yields, and late maturity. The following companies have seed distribution rights: Bonis and Company, Lindsay, Ont.; Manitoba Pool Elevators, Winnipeg, Man.; and Newfield Seeds, Nipawin, Sask.

Bellevue was developed by the Crop Development Centre, University of Saskatchewan, in 1987. It is yellow-seeded and has medium-size seeds (180 g per 1000 seeds), high yields, and late maturity. It has a strong seed coat that resists splitting. The SeCan Association, Ottawa, Ont., has seed distribution rights.

Express was developed by A.B. Svalof, Sweden, and was registered in Canada in 1987. It is yellow-seeded and has medium to large seeds (240 g per 1000 seeds), high yields, and early maturity. The following companies have seed distribution rights: Bonis and Company, Lindsay, Ont.; Manitoba Pool Elevators, Winnipeg, Man.; and Newfield Seeds, Nipawin, Sask.

Princess was developed by the Wilbur Ellis Company in the United States and was registered in Canada in 1988. Princess is a green-seeded cultivar with medium-size seeds (200 g per 1000 seeds). It is early maturing, but its yields are lower than those of Tara, Victoria, or Bellevue. It is popularly grown in Saskatchewan. CanMar Grain Inc. has seed distribution rights.

For specific recommendations on cultivars in your area refer to provincial field crop recommendations.